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(54) Title: A DATA INFORMATION SYSTEM

(57) Abstract

A data information system uses a record carrier (1) for use with issuers A-C having issuance terminals (2). The record carrier is provided by a provider (Z). The card has a plurality of tracks (10-12) each track being capable of supporting "buckets" of data indicative of an issuer A-C and of an event, e.g., credit points, associated with the issuer A-C. The event data is correlated with issuer data at redeemer stations (X, Y), each redeemer station having a reader (5) arranged to correlate the number of credit points with a particular issuer. The invention also discloses an arrangement for writing data to the record carrier and for reading data from the record carrier, and also a data information system incorporating the same. Furthermore the invention discloses a device for cleaning the record carrier which may be in the form of a credit card or the like.

A DATA INFORMATION SYSTEM

5 Background of the Invention

This invention relates to a record carrier for storing data from a plurality of write means, to an arrangement for writing data to the record carrier, to a reader for the record carrier, to a data information system using the
10 record carrier, and to a method of conveying data information using the record carrier.

Field of the Invention

In recent times, it has been customary to offer
15 incentives to customers and potential customers, in an endeavour to retain or obtain their loyalty to a particular product, or to a particular vendor. Foremost amongst these loyalty-incentive schemes have been trading stamps, where the purchaser of goods receives a quantity of the trading
20 stamps related to the value of the purchases made.

The trading stamps were collected, and stuck into books which were then exchanged for goods. Trading stamps have a number of disadvantages. In particular, due to their adhesive quality, they are not easy for either the
25 customer or the vendor to keep, especially in damp conditions. From the vendor's point of view, trading stamps are bulky, difficult to handle and their fraudulent use is not easy to prevent. From the customer's point of view, the stamps are difficult to handle when out of their
30 book, and the large number of stamps necessary to obtain a substantial value for redemption are cumbersome.

A similar scheme, used frequently in the United Kingdom in association with petrol stations, concerns the issuing of collectable vouchers related to the value of
35 purchases made. Such vouchers are collected and exchanged,

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usually at the point of issue, for a narrow range of
articles.

Systems using magnetic cards which store information
representative of a value are also known in the art. A
5 first type of magnetic card system, used for example in
telephone systems, requires the user to buy a card which
contains information corresponding to a "full" state. As
the card is used, for example, for making a telephone call,
the information content on the card is changed to indicate
10 the amount of use which has taken place. Finally the
information stored on the card indicates to the apparatus
with which the card is being used that the card is "empty",
and usage of the telephone or other facility is thereupon
terminated. Such cards are usually magnetic-stripe cards,
15 although other types of cards have been proposed. The
magnetic-stripe cards have the advantages of being light
and small, as well as being cheap to manufacture.

There are also card systems in use, consisting of
magnetic-stripe cards, and card-write means and card-read
20 means at a number of different locations. The systems are
analogous to the collectable tokens system in that credits
are made to a card of a purchaser, the amount of credit
being related to the value of a purchase made. When the
card has been credited to a value corresponding to the
25 "full" state of the card, the card is exchanged for an item
of a predetermined value, such as a gift token. In a known
system the "full" cards are sent to a central control
location, together with written information indicating the
identity of the card holder. The item returned to the card
30 holder is also sent, for instance by post. Systems of this
type are relatively expensive to operate and require either
pre-payment for the credits to be issued or only a single
credit issuer organisation. This is because there is no
way of indicating the source of credits on a particular
35 card and thus no way of reconciling credits issued by a

particular issue with credits redeemed.

According to a first aspect of this invention there is provided a record carrier storing data from a plurality of write means, said record carrier including a storage area

5 capable of adaptive configuration by said plurality of write means whereby said data in said area is representative of and discerns each said write means and is representative of an event associated with each said write means.

10 Preferably said data comprises identifying data indicative of the identity of a respective write means and event data indicative of an event associated with the respective write means.

Conveniently said event data is representative of a

15 numerical value.

Advantageously the event data for each identified write means is stored as a total numerical value for said each identified write means.

Conveniently the event data for all of the identified

20 write means is stored in said storage area as a total separately from said event data for each identified write means.

Advantageously said data further comprises record carrier identifying data, distinctive of the record

25 carrier.

Conveniently the record carrier is of substantially credit-card dimensions.

Advantageously data are stored on magnetic tracks.

According to a second aspect of this invention there

30 is provided an arrangement for writing data to a non visibly readable record carrier, comprising means for providing identifying data indicative of the said arrangement, means for providing event data representative of an event associated with said arrangement, and write

35 means for writing a data portion including said identifying

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data and said event data to said record carrier such that
the data portion indicates the event data and the
arrangement writing said data portion.

Advantageously said write means writes to said record
5 carrier one or more times.

Preferably said event data is representative of a
numerical value.

In a preferred embodiment the arrangement comprises a
record carrier reader for providing read data corresponding
10 to data stored on an associated record carrier, and a
detector for evaluating said read data, the output of the
detector controlling the write means.

Conveniently the detector determines the total
numerical value of all previously stored event data on said
15 record carrier and provides a control signal for inhibiting
said write means if the total value exceeds a predetermined
value.

Advantageously the detector detects the number of
previously stored data portions on said recorder carrier
20 and provides a control signal for inhibiting said write
means if said number exceeds a predetermined number.

Preferably the detector detects previously stored
identifying data in said read data, and said arrangement
further comprises comparison means for comparing said
25 previously stored identifying data with said identifying
data indicative of the arrangement of concern, whereby if
no previously stored data portion includes identifying data
indicative of said arrangement, then said write means
writes a new data portion to said record carrier, said new
30 data portion comprising identifying data indicative of said
arrangement and event data associated with said
arrangement.

Advantageously the detector is arranged to detect
previously stored event data of said previously stored data
35 portions and if a stored data portion includes identifying

data indicative of said arrangement, the said write means
writes a data total representative of the sum of:

  (a) the new numerical value of said event data
  associated with said arrangement; and

5 (b) the numerical value of said previously stored
  event data to that portion in place of said previously
  stored event data.

Conveniently the arrangement further comprises means
for determining the number of data portions to be written
10 to said record carrier, and control means responsive to the
said number for controlling said write means whereby said
number of times of writing said data portions depends on
the number of data portions.

Preferably stored data portions and, if applicable, a
15 new data portion are written afresh to said record carrier
whereby data portions representative of data having higher
numerical values of event data are presented for reading
before data portions having lower numerical values of event
data.

20 Advantageously the arrangement has discriminator means
for discrimination of data portions to be written to said
record carrier into first data portions having identifying
data exhibiting a first characteristic and second said data
portions having identifying data exhibiting a second
25 characteristic and format control means, responsive to the
total number of data portions to be written to said
recorder carrier and operable if the total number of data
portions exceeds a predetermined threshold to cause said
write means to write to said record carrier only event data
30 from a first said data portion, and to write to said record
carrier said second data portions including identifying
data and event data.

Conveniently said event data associated with said
arrangement is written to memory means associated with said
35 arrangement substantially contemporaneously with writing

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said data to said record carrier.

Advantageously a keyboard is provided for input of said event data to said arrangement.

Conveniently said record carrier is of substantially
5 credit card dimension.

Preferably data are stored in magnetic tracks on said record carrier.

According to a third aspect of the present invention there is provided an arrangement for accessing a record
10 carrier, having means for providing identifying data representative of the said arrangement, means for providing event data representative of a numerical value, record carrier reader means for providing read data corresponding to data previously stored on said record carrier, write
15 means for writing to said record carrier data comprising a data portion including said identifying data and said event data, such that the data portion indicates the event data and the arrangement writing said data portion, and processor means responsive to said read data for
20 controlling said write means to write said data portion as a new data portion if said read data does not include a data portion having identifying data representative of the said arrangement.

Preferably said write means is controllable by said
25 processor means to write said data portion to said record carrier one or more times.

Advantageously said processor means determines the number of times to write said data portion in dependence upon the number of previously stored data portions found in
30 said read data.

According to a fourth aspect of this invention there is provided a reader for a record carrier embodying data input by one or more write means, said data comprising identifying data representative of said write means and
35 event data indicative of an event recorded by said write

means, said reader including means for reading said identifying data, means for reading said event data and means for correlating said identifying data and event data associated therewith.

Preferably the reader comprises means for storing said correlated identifying data and event data.

Conveniently the reader further comprises data communication means for transmitting said correlated identifying and event data to data processor means.

According to a fifth aspect of this invention there is provided a data information system comprising two or more record carrier write means, each record carrier write means being adapted to write identifying data representative of said record carrier write means and event data indicative of an event onto a record carrier provided in operation, and record carrier read means for evaluating from said record carrier said identifying data and said event data.

According to a sixth aspect of this invention there is provided a method of conveying data information utilising a plurality of read-write arrangements, each comprising means for providing identifying data indicative of the respective read-write arrangement, means for providing event data to the respective read-write arrangement, said event data being indicative of an event associated with the respective arrangement and at least one record carrier evaluator, comprising the steps of:

(a) providing at least one record carrier;

(b) bringing said record carrier into co-operation with a respective read-write arrangement;

(c) writing a data portion to said record carrier, said data portion comprising said identifying data and said event data;

(d) bringing said record carrier into co-operation with a record carrier evaluator;

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(e) evaluating data written to said record carrier; and

(f) correlating said identifying data with said event data so as to identify the read/write arrangement with which said event was associated.

Preferably step (c) comprises writing said data portion one or more times.

Advantageously step (b) further comprises:

1. reading said record carrier;

2. determining whether said carrier embodies previous data portions comprising identifying data indicative of a read/write arrangement;

3. storing each said previous data portion in said read/write arrangement; and

4. step (c) further comprises writing said stored data portions to said record carrier.

Conveniently the method further comprises the steps of:

counting the number of data portions to be written to a record carrier and in dependence thereon, controlling said number of times of writing said data portion.

Preferably in the method, if said counted number of data portions is below a first threshold, said write means is controlled to write said data portions twice, and if said counted number is above said first threshold, said write means is controlled to write said data portion once.

Advantageously the method further comprises the steps of:

discriminating the data portions to be written to said record carrier into first data portions having identifying data exhibiting a first characteristic and second data portions having identifying data exhibiting a second characteristic; and

in dependence on the counted number of data portions to be written to a record carrier, writing said second data

portions to said record carrier and, from a first data portion, writing only event data to said record carrier.

Advantageously said event data represents a numerical value and in step (e) data portions are written to said record carrier with data portions representing numerical values of event data of higher value being presented on said record carrier before said portions representing lower numerical value.

Conveniently said record carrier is a magnetic-stripe card.

A Brief Description of the Drawings

The invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 shows a schematic diagram of a data information system in accordance with an aspect of the invention;

Figures 2(a) to 2(c) show a record carrying card in accordance with another aspect of this invention in which the Figures show formats of data stored on the record carrying card at different stages of use;

Figure 3(a) shows a schematic diagram of an arrangement for writing data in accordance with a further aspect of this invention;

Figure 3(b) shows a schematic view of a keyboard for use with the arrangement for writing data;

Figure 4 shows a schematic diagram of a reader for a record carrier;

Figure 5 shows the arrangement for writing data in combination with an electronic point of sale (EPOS) terminal;

Figure 6 shows the arrangement for writing data in combination with a data processor unit; and

In the Figures, like reference numerals indicate like parts.

10

The data information system shown in Figure 1 has first, second and third issuers A, B and C, normally at different locations, which each have stocks of "empty" cards 1 furnished by a card provider Z. The issuers each

5   have a respective arrangement for writing data, each arrangement comprising one or more credit issuance terminals 2. Where the arrangement comprises more than one terminal, the terminals may be dispersed, for instance distributed among premises of the issuer in different

10 locations, eg cities, towns. In the currently described preferred embodiment, the cards are three-track magnetic stripe cards, known per se. First and second redeemers X and Y have card value readers 4 and readers for record carriers hereinafter called card control readers 5. A card

15 provider effects central control using a data processor 6 coupled via data channels 7 and 8 to respect card readers 5.

As a customer completes a first transaction on the premises of one of the credit issuers A, B, C, the customer

20 will be given a new card 1 with a data portion (101, 102 in Figure 2(a)-(c)) written to it having data representative of the identity of the one credit issuer (identifying data 101) and a numerical value representative of credit points (event data 102) made by that issuer. Alternatively the

25 customer will provide a card already in his possession to the issuer so that the issuer can write that data portion to the card. The identifying data in the presently described embodiment consists of an account number representative of the issuer of concern. Data which

30 includes the identifying data of a credit issuer together with the amount of credit (event data) input by that issuer is written to the card in a unit termed herein a "bucket". As will be described later herein, a data portion written to the card may be a single bucket, or plural buckets.

35   In the presently described embodiment, such event data

includes data on the first and last transaction entered by
a credit issuer of concern. This data includes the time
and date of the first and last transaction entered by the
credit issuer, and data identifying the specific credit
5 issuance terminals where those first and last transactions
were entered. Where only one transaction has been entered
by the credit issuer, the first and last transactions are
coterminous and written accordingly. The last transaction
is updated when a second or subsequent transaction is
10 entered by the same issuer.

Each time a transaction is made, information on the
card is read off the card, and re-written to the card
including any updating data.

Depending on the number of credit issuers who have
15 entered information to the card, the information stored on
the card is held in different formats. As the card is
credited by more and more credit issuers, the format of the
data is adapted to allow for the higher data quantities
involved whilst retaining storage security, as far as
20 possible. In this respect;

a. As shown in Figure 2(a) for the first few credit
issuers visited, data portions written to the card have
buckets 101, 102 repeated to achieve multiple redundancy
using two tracks 10, 12 of the three tracks 10, 11, 12 on
25 the card. For example, for 1-4 credit issuers visited, the
data portion for each issuer has four buckets. On each of
the two tracks used for storing buckets, the buckets are
written in a first order (A, B, C, D) and then the
information repeated in a second order of the buckets (D,
30 C, B, A) the second order being a mirror-image of the first
order. This helps to overcome problems caused by physical
damage to the magnetic stripe, as later described herein.

b. When a first threshold number of credit issuers
is visited but less than a second threshold number of
35 credit issuers, e.g., 5-8 credit issuers, then the data

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portions already written on the card are read off, as
described above, and buckets making up data portions are
re-written only once per track on the two bucket-storage
tracks 10, 12 of the card, with each data portion having
5   one bucket in each of the tracks, i.e., the buckets
associated with issuer A-H are written once onto track 10
and once onto track 12.   Track 11 referred to as the
"redemption track" does not store buckets (as shown in
Figure 2(b).   In this case the arrangement of buckets on
10 bucket-storage track 12 is maintained as a mirror-image of
the arrangement of buckets on the track 10.

        c.   If the second higher threshold number of credit
issuers is exceeded, redundancy can no longer be achieved
and buckets are only stored once, each bucket being
15 presented on a single track only as shown in Figure 2(c).
In other words, the data portion for each issuer has a
single bucket.

        In the presently described embodiment, the redemption
track, track 11 of the card stores data termed "redemption
20 data", including the total value of the credit held on the
card, the total value of the credit issued by prepaying
credit issuers, described later herein, and data
identifying the specific credit issuance terminal last
visited and a security number.

25   The redemption track 11, further holds so-called
"fixed data", which does not vary with the value of
transactions. The fixed data includes a unique identifier
for the card, data identifying the credit issuance terminal
at which the card was first used, together with the time
30 and date of that use, and also data identifying the latest
credit issuance terminal used for a transaction, with the
time and date of that transaction.   Thus certain of the
fixed data is updated upon each transaction. Fixed data is
also held on both the bucket-storage tracks 10, 12,
35 although if the card is used for large numbers of credit

issuers, the fixed data on one bucket-storage track 12 may be sacrificed if required while retaining two copies of fixed data on the other bucket-storage track and the redemption track, to provide redundancy.

5   It has been found advantageous to rank the respective buckets according to the numerical value of credit points they represent. Each time credits are made to a card the bucket with the highest numerical value of credit points on the card is written in a position on the card whereby that value will be read first by a reader, and is followed by successive buckets representative of a descending order of credit points. For the case where only a few issuers appear on the card (enabling the use of redundancy as described above) the "mirror-image" presentation allows the card to be read from either direction while at the same time ensuring that the highest value bucket (A) is read first.

      Cards may become physically damaged, for instance by a key or coin scratch across the magnetic stripe, and this would normally result in data loss. However the method described above using redundancy provides a high degree of data security against such damage.

      Two types of credit issuers are envisaged in the system, namely pre-paying credit issuers who pay the card redeemer in advance for a number of credits to be made to cards, and post-paying credit issuers who pay in arrears according to the actual number of credits which they have actually entered onto cards. To differentiate between pre-paying issuers and post-paying issuers, a separate data bit could be used, but in the presently described preferred embodiment, the different account numbers of the credit issuers are used. To avoid the need for each credit issuance terminal carrying out extensive checks on identifying data from a card of concern, pre-paying and post-paying issuers have accounts numbered in separate

numerical regions, for instance account numbers below 500
being for pre-paying issuers, and those above 500 for post-
paying issuers. It is essential for the card redeemer
accurately to ascertain the amount of credit entered by
5   each post-paying credit issuer so as to charge them
correctly. Hence buckets from post-paying credit issuers
are stored securely in that they are retained in full on
the card until redemption. If a card is used at a
sufficient number of credit issuers that the card becomes
10   filled with buckets from post-paying issuers, a subsequent
attempt to add a new bucket will result in rejection of the
card by the terminal, as described later herein.

It may be useful for the card provider to be able to
detect how much credit was issued by each pre-paying credit
15   issuer e.g., for market information purposes. To this end,
buckets from pre-paying issuers are stored on respective
cards until a first predetermined number of credit issuers,
e.g. 9 issuers, appears on the card. A card used at only
a small number of credit issuers thus retains buckets from
20   both post-paying and pre-paying credit issuers. However,
once a card has more than the first predetermined number of
issuer entries, the buckets of pre-paying issuers are
sacrificed one by one as necessary to make space for
buckets from post-paying issuers. The total of pre-paid
25   credit points is already held on the card on the redemption
track 11, and thus the customer's credit remains the same
regardless of such bucket sacrifices. Once a second
predetermined number of credit issuers, e.g. 17 issuers,
appears on the card, no buckets of prepaying issuers are
30   stored, as such buckets will all have been sacrificed.

Analysis of the habits of consumers has shown that
under normal day to day conditions only a few credit
issuers will be visited during the life of a particular
35   card. This is particularly true where the maximum credit

storable on a card is low, as is preferred. Thus although
the system as a whole may have a large number of credit
issuers, cards need only cater for a relatively small
number, for example between ten and thirty issuers.

5   Figure 3(a) shows a schematic diagram of an
arrangement for writing data to a record carrier, the
arrangement comprising a single credit-issuance terminal.
It will of course be understood that an arrangement for
writing data may include plural such terminals. In such a
10 multi-terminal arrangement, each terminal will write the
same arrangement-identifying data to associated cards, and
may also write data representative of the specific terminal
of the plurality, as described above herein.

        The single terminal of the presently described
15 embodiment consists of a card reader/writer 21 coupled via
a communication channel 201 to a processing unit 22. The
processing unit is linked via a data channel 203 to a
memory 23. The processing unit 22 is coupled via a further
data channel 204 to a customer display unit 24, and via yet
20 a further data channel 205 to an operator module 25 having
an operator display 26 and a keypad 27. A data bus 206 may
also be connected to the processing unit 22, the bus 206
allowing the credit-issuance terminal to cooperate with
other devices (described later herein with reference to
25 Figures 5 and 6).

        The keyboard for the credit issuance terminal is shown
in Figure 3(b) and has numerical keys 31, control keys 32,
e.g., "ENTER", "DELETE", and three code keys 33, described
later herein.

30   In use the customer display 24 is positioned to be
visible to a customer. When no card is in the terminal 21
the processing unit 22 may provide customer display
messages, preferably so that over a period of time the
whole display is activated. This draws the attention of
35 the customer to the display and conveys messages to him,

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while at the same time providing a test of the display.

The operation of the credit issuance terminal 2 will now be described in greater detail.

When a customer has made one or more purchases and
5   wishes to have a corresponding amount of credit entered to a card, card 1 is inserted into a slot on the credit-issuance terminal 2 so as to associate it with the card reader/writer 21. If the card was previously unused, the issuance terminal detects this and writes a unique
10 identifier to the card to initialise it for use. If the card has been previously used, the card reader/writer 21 is controlled by the processing unit 22 via channel 201 to read information held on the card 1. The processing unit detects the data read by the reader/writer 21 and carries
15 out various checks, for instance to check the card identifier for validity and also to ensure that the card does not carry the full capacity of credit for such a card as described later herein. If the card is indeed full, then the credit issuance terminal will reject the card. If
20 the card is acceptable to the terminal, information from the card is transferred to temporary storage of the processing unit 22. As previously discussed this information includes the identity and amount of credit already made to the card by post-paying credit issuers,
25 derived from the or each bucket of the data portions entered by such issuers, information on pre-paying credit issuer transactions, the card unique identifier, the total amount of credit on the card and the total amount of pre-paid credit on the card, together with time information of
30 transactions. The customer display 24 shows the total amount of credit already on the card 1. If the credit issuance terminal 2 is a stand-alone device, then an operator will key in using the numeric keys 31 shown in Figure 3(b) the value of the purchase made and also may use
35 one or more of the code keys 33 to indicate the type of

transaction which has been made. The number and type of
code keys and their method of use depend on the type of
transactions of interest. For example, if the credit
issuance terminal 2 is situated at a petrol filling
5 station, five code keys 33 could be used, representing the
fact that the majority of the purchase value was in respect
of leaded petrol, unleaded petrol, diesel fuel, other
vehicle-based purchases and food or confectionery,
respectively. Alternatively, the code keys 33 may be used
10 as tariff keys to set the amount of credit given for a
particular value of purchase inputted by using the numeric
keys 31. In this event, only three code (tariff) keys
might be used, the first representing a first rate of
credit per unit value of purchase, the second representing
15 double the first and the third representing treble the
first. The code or tariff keys may also be arranged to
selectively issue a standard amount of\ credit.

It is also envisaged that if the application demands,
the operator could key in a number of credit points
20 directly, although this is not a preferred feature.

Having entered details of the value of the transaction
or the amount of credit by the numeric keys 31, and the
nature of the transaction by the code keys 33, the operator
uses the control keys 32 to enter the information to the
25 temporary storage of the processing unit 22. If the
present issuer is a post-paying issuer, the processing unit
22 examines the data now held in temporary storage to check
that:-

a.   the present credit issuer is an issuer one
30   of whose outlets has been visited before (i.e., that
       a data portion from the card has issuer identifying
       data corresponding to the identifying data of the
       present credit issuer), or that sufficient card
       capacity would exist to enter a new data portion
35   consisting of at least one bucket,

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     b.   that the total credit existing on the card added to the credit about to be issued by the credit issuance terminal will not exceed the maximum capacity of the card.

5   If the credit issuance terminal of the post-paying issuer finds that a data portion therefor has not previously been entered on the card and that the card lacks the capacity for such a new data portion, for example if 27 credit issuers appear on the card, the customer display

10   will produce a message advising the customer that although the card does not contain the maximum possible credit for the card, further credits can only be made at an outlet of an issuer already having a data portion on the card. The display will then advise the operator to insert a new card,

15   and the relevant credit may be entered to such a new card.

The card has a predetermined maximum credit capacity and if the card has insufficient capacity remaining for the amount of credit to be made, then an amount of credit sufficient to completely fill the card to the predetermined

20   maximum is made, this amount being decremented from the total amount to be credited at the particular transaction. The remaining amount to be credited is then applied to a further card or further cards for the customer concerned.

If the credit issuance terminal is able to credit to

25   the card of concern then the relevant amount of credit is added to the event data for the card, either adding to the total of a data portion already existing or assembling the data for a new data portion. The data portion are ranked in descending order of credit and are written to the card

30   with the number of buckets relevant to the number of credit issuers concerned, as described above. At the same time the running total of credit points on the card and, if appropriate, the number of credit points entered by pre-paid issuers is updated by the issuance terminal for

35   writing to the card. Furthermore, relevant items of fixed

data and the redemption data, described above herein, are updated by the terminal so that the present terminal identity will be recorded as the latest terminal visited.

If the processing unit 22 of the credit issuance terminal detects that more than the first predetermined number (mentioned above) of credit issuers have entries for the card, then data portions for pre-paying issuers are sacrificed as necessary, the pre-paying issuer information being retained as a sub-total.

If the present issuer is pre-paying, then not all of the above steps may be needed. However, in that case, the terminal will increment the pre-paying total data on the card as well as the overall total event data by the amount credited.

At substantially the same time as the information is re-written to the card 1 associated with the reader/writer 21, the data from the current transaction, including the amount of credit, the card identifier and the time of the transaction are transferred to the memory 23. This data may be accessed by the processor 22 for checking, as later described.

Each issuance terminal is pre-loaded with a predetermined number of credit points. The credit points of an issuance terminal are set by a loading card issued by the card provider and physically taken to an issuance terminal 2. The loading card is inserted into the reader/writer 21 of an issuance terminal to enable the terminal to issue a predetermined amount of credit points by "filling up" a portion of the memory 23 on the credit issuance terminal with unallocated points. The processing unit 22 recognises that the loading card is such a card, and transfers the credit points data to the memory 23. While inserted into the issuance machine, the loading card also acquires from the credit issuance terminal information, stored in the memory of the issuance terminal,

relating to transactions made since the last loading
operation. The processor 26 of the terminal is programmed
to carry out credibility checks on transactions made, for
example the amounts of credit. It also checks other
5 factors, for example whether repeated credits have been
made to the same card. Data concerning over-high or
repeated credits are output from the credit issuance
terminal to the loading card. In the presently described
embodiment, the loading card is returned to the provider
10 for reading the information obtained from the issuance
terminal in a card control reader 5 of the provider.
However, it would be possible for the information
downloaded onto the loading card to be read-off by a
similar card control reader held by the credit issuer
15 himself.

Once a suitable amount of credit has been made to the
card 1 the customer takes the card to a card redeemer X,
for purchase or part-purchase of goods or services.

At the card redeemer X, Y the card 1 is read by a card
20 value reader 4 to ascertain the amount of credit points on
the card and the credit points redeemed. In the preferred
embodiment, the unique identifier of the card is read and
stored to prevent re-use of the credit, but such fraud
could be prevented in other ways, for instance by setting
25 an indicator on the card.

As the card is read by the card value reader 4 a
customer display similar to that on the credit issuance
terminal 2 shows the number of credit points available on
the card, and also the monetary value associated with those
30 points. Preferably the card value reader 4 is operatively
connected to an electronic point of sale (EPOS) unit. Such
a connection allows the customer to use the card directly
as part or full payment for items purchased from the
redeemer.

35   The record-carrying card - is retained by the card-

redeemer X so as to allow the information stored on the card to be accessed by the card control reader 5. The card control reader 5 shown in Figure 5 may be a separate card reader located on the premises of the card redeemer, or may

5   be integrated with the card value reader.   It is also possible that the card control reader 5 may be situated remotely from the card value reader 4, for example, at a single central control location, but this arrangement is not preferred.

10   The card-control reader 5 has a card-reader 501 coupled via bus 502 to a processor module 503. The processor module 503 is in turn connected via a communication path 504 to the data processor 6. When a card 1 has been redeemed, it is read in the card reader

15   501. Data from the card is transferred over bus 502 to the processor module 503 for evaluation. The processor module 503 has a buffer store for the evaluated data, and periodically the contents of the buffer store are transmitted over the communication path 504 to the data

20   processor 6. The data processor is connected via further communication channels 505 to other card control readers 5. The nature of the communications paths 504, 505 is appropriate to the separation between the data processor and the card control readers 5, and could be radio links,

25   land lines, or optical fibres, for instance. In the processor module 503 the data read from the card 1 is checked for self-consistency. To this end the credit points from each stored data portion are totalled, and, if appropriate, added to the pre-paid credit total and the

30   resultant is compared with the total value of points stored on the card. The values of credit points in each stored data portion are then added to the appropriate respective running totals for each credit issuer held in the buffer storage area of the processor module 503.

35   As mentioned above the credit issuance terminal 2 may

22

be associated with other devices.

In the arrangement of Figure 5, the terminal 2 is coupled to an EPOS terminal 50, making the actions to operate the credit issuance terminal less complex. The
5 card is introduced into the slot on the credit issuance terminal, and the customer display indicates the same information as previously. However, when the purchase has been completed the EPOS terminal 50 automatically sends the credit data to the processing unit without the need for the
10 operator to input this data manually by the keyboard. The credit points may be transferred to the card, and to the internal memory of the terminal, either by using the enter key on the keypad, or in response to a stimulus from the EPOS terminal 50 itself.

15 A further arrangement is shown in Figure 6 which enables the credit issuance terminals to be remote from the point of sale, but coupled to a local data processor 60. In this arrangement the operation is as follows:-

Upon making a purchase at a first point of sale
20 device, a purchaser's card is passed through a local card reader to identify the particular card and the amount of credit points to be added which information is fed to the remote data processor 60. The purchaser may then make further purchases at other points of sale, each time
25 passing his card through respective point of sale card readers. Once all purchases have been completed, the card is taken to a remote credit issuance terminal where the total of credits made is entered onto the card for the processor 60.

30 In both of the arrangements shown in Figure 5 and 6 it may not always be strictly necessary for the credit issuance terminal to maintain its own memory for transactions made, since the data processor unit or the EPOS terminal itself may be capable of assuming the
35 function of storage of the transactions.

23

The bus 206 also allows the credit issuer to obtain information on the transactions of the credit issuance terminal. To this end, an analyser device, for example, a

5   laptop computer 207, may be coupled to the bus 206. The information from the memory 23 is then downloaded for analysis, e.g., for recognising fraudulent use of the terminal.

As described above, the record-carrier is a magnetic-

10 stripe type card, but the invention is not to be limited thereto. In this respect other types of machine-readable carriers could alternatively be used, e.g. smart cards and optical cards. Also, although Figure 1 was described using only three issuers it will now be understood the invention

15 is not limited thereto.

24

CLAIMS:

5   1.   A record carrier storing data from a plurality of
    write means (2), said record carrier (1) including a
    storage area (10, 11, 12) capable of adaptive configuration
    by said plurality of write means whereby said data (101,
    102) in said area is representative of and discerns each
10 said write means (12) and is representative of an event
    associated with each said write means (2).

    2.   A record carrier according to claim 1 wherein said
    data comprises identifying data (101) indicative of the
15 identity of a respective write means (2) and event data
    (102) indicative of an event associated with the respective
    write means (2).

    3.   A record carrier according to claim 2 wherein said
20 event data (102) is representative of a numerical value.

    4.   A record carrier according to claim 3 wherein the
    event data (102) for each identified write means (2) is
    stored as a total numerical value for said each identified
25 write means.

    5.   A record carrier according to claim 4 wherein the
    event data (102) for all of the identified write means (2)
    is stored in said storage area as a total separately from
30 said event data for each identified write means.

    6.   A record carrier according to any preceding claim
    wherein said data further comprises record carrier
    identifying data, distinctive of the record carrier.

35

25

7.   A record carrier according to any preceding claim
which is of substantially credit-card dimensions.

8.   A record carrier according to claim 7 wherein data are
5   stored on magnetic tracks.

9.   An arrangement for writing data to a non visibly
readable record carrier (1) comprising means (22) for
providing identifying data indicative of the said
10 arrangement, means (27) for providing event data
representative of an event associated with said arrangement
and write means (21) for writing a data portion (101, 102)
including said identifying data (101) and said event data
(102) to said record carrier (1) such that the data portion
15 indicates the event data and the arrangement writing said
data portion.

10.   An arrangement according to claim 9 wherein said write
means (21) writes said data portion to said record carrier
20 (1) one or more times.

11.   An arrangement according to claim 10 wherein said
event data (102) is representative of a numerical value.

25 12.   An arrangement according to claim 11 further
comprising a record carrier reader (21) for providing read
data corresponding to data stored on an associated record
carrier (1), and a detector (22) for evaluating said read
data, the output of the detector controlling the write
30 means (21).

13.   An arrangement according to claim 12 wherein said
detector (22) determines the total numerical value of all
previously stored event data on said record carrier (1) and
35 provides a control signal for inhibiting said write means

(21) if the total value exceeds a predetermined value.

14. An arrangement according to claims 12 or 13 wherein said detector (22) detects the number of previously stored
5 data portions on said recorder carrier (1) and provides a control signal for inhibiting said write means if said number exceeds a predetermined number.

15. An arrangement according to claim 14 wherein said
10 detector (22) detects previously stored identifying data in said read data, and said arrangement further comprises comparison means (22) for comparing said previously stored identifying data (101) with said identifying data indicative of the arrangement of concern, whereby if no
15 previously stored data portion includes identifying data indicative of said arrangement, then said write means (21) writes a new data portion to said record carrier, said new data portion comprising identifying data (101) indicative of said arrangement and event data associated with said
20 arrangement.

16. An arrangement according to claim 14 wherein the detector (22) is arranged to detect previously stored event data of said previously stored data portions and if a
25 stored data portion (101, 102) includes identifying data indicative of said arrangement, the said write means writes a data total representative of the sum of:
        (a) the numerical value of event data (102) representative of said event associated with said
30   arrangement; and
        (b) the numerical value of said previously stored event data representative of previous events associated with said arrangement to that portion in place of said previously stored event data whereby
35   said event data is updated.

27

17. An arrangement according to any of claims 10 to 16 further comprising means (22) for determining the number of data portions to be written to said record carrier (1), and
5 control means (22) responsive to the said number for controlling said write means (21) whereby said number of times of writing said data portions (101, 102) depends on the number of data portions (101, 102).

10 18. An arrangement according to claim 17 wherein means (21, 22) are provided for writing afresh previously stored data portions (101, 102) and, if applicable, a new data portion (101, 102) to said record carrier (2) whereby data portions representative of data having higher numerical
15 values of event data are presented for reading before data portions having lower numerical values of event data.

19. An arrangement according to claim 18 having discriminator means (22) for discrimination of data
20 portions to be written to said record carrier (1) into first data portions having identifying data exhibiting a first characteristic and second said data portions having identifying data exhibiting a second characteristic and format control means (22), responsive to the total number
25 of data portions to be written to said recorder carrier (1) and operable if the total number of data portions exceeds a predetermined threshold to cause said write means to write to said record carrier only event data from a first said data portion, and to write to said record carrier said
30 second data portions including identifying data and event data.

20. An arrangement according to any one of claims 9 to 18 wherein means (22) are provided for writing said event data
35 associated with said arrangement to memory means (23)

28

associated   with   said   arrangement   substantially
contemporaneously with writing said data to said record
carrier.

5   21.   An arrangement according to any of claims 9-20 wherein
    a keyboard (25) is provided for input of said event data
    (102) to said arrangement.

    22.   An arrangement as in any of claims 9-21 wherein said
10 record   carrier   (1)   is   of   substantially   credit   card
    dimension.

    23.   An arrangement as in claim 22 wherein data are stored
    in magnetic tracks on said record carrier (1).
15
    24.   An arrangement for accessing a record carrier, having
    means   (22)   for   providing   identifying   data   (101)
    representative of the said arrangement, means (22) for
    providing event data (102) representative of a numerical
20 value, record carrier reader means (21) for providing read
    data corresponding to data previously stored on said record
    carrier, write means (21) for writing to said record
    carrier data comprising a data portion including said
    identifying data (101) and said event data (102), such that
25 the   data   portion   indicates   the   event   data   and   the
    arrangement writing said data portion, and processor means
    (22) responsive to said read data for controlling said
    write means (21) to write said data portion as a new data
    portion if said read data does not include a data portion
30 having   identifying   data   representative   of   the   said
    arrangement.

    25.   An arrangement according to claim 24 wherein said
    write means (21) is controllable by said processor means
35 (22) to write said data portion to said record carrier one

29

or more times.

26. An arrangement according to claim 25 wherein said processor means (22) determines the number of times to
5   write said data portion (101, 102) in dependence upon the number of previously stored data portions found in said read data.

27. A reader for a record carrier embodying data input by
10 one or more write means (2), said data comprising identifying data (101) representative of said write means and event data (102) indicative of an event recorded by said write means (2), said reader including means (501) for reading said identifying data, means (501) for reading said
15 event data and means (503) for correlating said identifying data and event data associated therewith.

28. A reader according to claim 27 further comprising means (503) for storing said correlated identifying data
20 and event data.

29. A reader according to claims 27 or 28 further comprising data communication means (504) for transmitting said correlated identifying and event data to data
25 processor means (6).

30. A data information system comprising two or more record carrier write means (21), each record carrier write means (21) being adapted to write identifying data (101)
30 representative of each said record carrier write means and event data (102) indicative of an event onto a record carrier (1) provided in operation, and record carrier read means (5) for evaluating from said record carrier said identifying data (101) and said event data (102).

35

31. A method of conveying data information utilising a plurality of read-write arrangements (2), each comprising means (22) for providing identifying data (101) indicative of the respective read-write arrangement, means (22) for
5 providing event data (102) to the respective read-write arrangement, said event data (102) being indicative of an event associated with the respective arrangement and at least one record carrier evaluator (5), comprising the steps of:

10   (a) providing at least one record carrier (1);

              (b) bringing said record carrier into co-operation with a respective read-write arrangement (2);

              (c) writing (21) a data portion to said record
15 carrier (1), said data portion comprising said identifying data (101) and said event data (102);

              (d) bringing said record carrier (1) into co-operation with a record carrier evaluator (5);

              (e) evaluating data written to said record
20 carrier (1); and

              (f) correlating said identifying data (101) with said event data (102) so as to identify the read/write arrangement (2) to which said event was associated.

25 32. A method of conveying data information according to claim 31 wherein step (c) comprises writing (21) said data portion one or more times.

33. A method of conveying data information according to
30 claim 32 in which step (b) further comprises:

              1. reading (21) said record carrier (1);

              2. determining (22) whether said carrier (1) embodies previous data portions comprising identifying data (101) indicative of a read/write arrangement (2);

35

31

3.   storing each said previous data portion
(101, 102) in said read/write arrangement (22); and
4.   step (c) further comprises writing (21)
afresh said stored data portions to said record
5   carrier.

34.   A method of conveying data information according to
claim 33 further comprising the steps of:
counting (22) the number of data portions (101, 102)
10   to be written to a record carrier (1) and in dependence
thereon, controlling said number of times of writing (21)
said data portion.

35.   A method of conveying data information according to
15   claim 34 wherein if said counted number of data portions is
below a first threshold, said write means (21) is
controlled to write (2) said data portions twice, and if
said counted number is above said first threshold, said
write means (21) is controlled to write said data portion
20   (101, 102) once.

36.   A method of conveying data information according to
claim 34 or 35 further comprising the steps of:
discriminating (22) the data portions to be written to
25   said record carrier into first data portions having
identifying data (10) exhibiting a first characteristic and
second data portions having identifying data (101)
exhibiting a second characteristic; and
in dependence on the counted number of data portions
30   to be written to a record carrier, writing (21) said second
data portions to said record carrier and, from a first data
portion, writing only event data (102) to said record
carrier.

35

37. A method of conveying data information according to claim 36 in which said event data (102) represents a numerical value and in step (e) data portions (101, 102) are written (21) to said record carrier (1) with data
5 portions representing numerical values of event data of higher value being presented on said record carrier (1) before said portions representing lower numerical value.

38. A method of conveying data information as in any one
10 of claims 31-37 wherein each said record carrier (1) is a magnetic-stripe card.

39. A reader substantially as herein described with reference to and as illustrated in Figure 4 of the
15 accompanying drawings.

40. A data information system as herein described with reference to and as shown in the accompanying drawings.

20 41. A method of conveying data information substantially as described with reference to and as shown in the accompanying drawings.
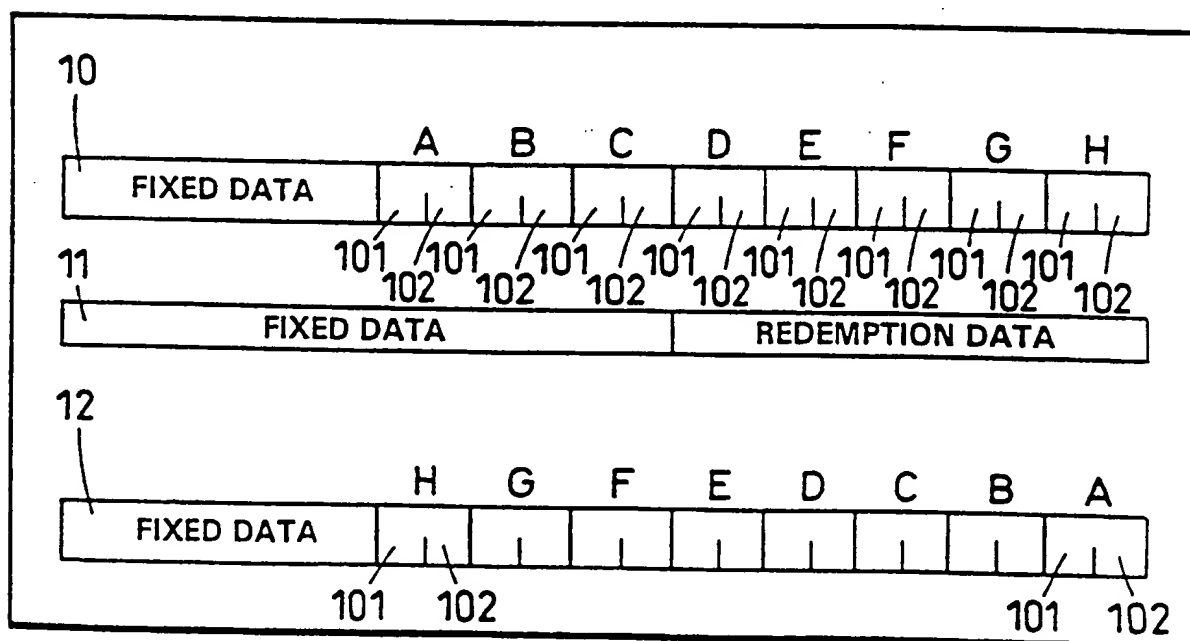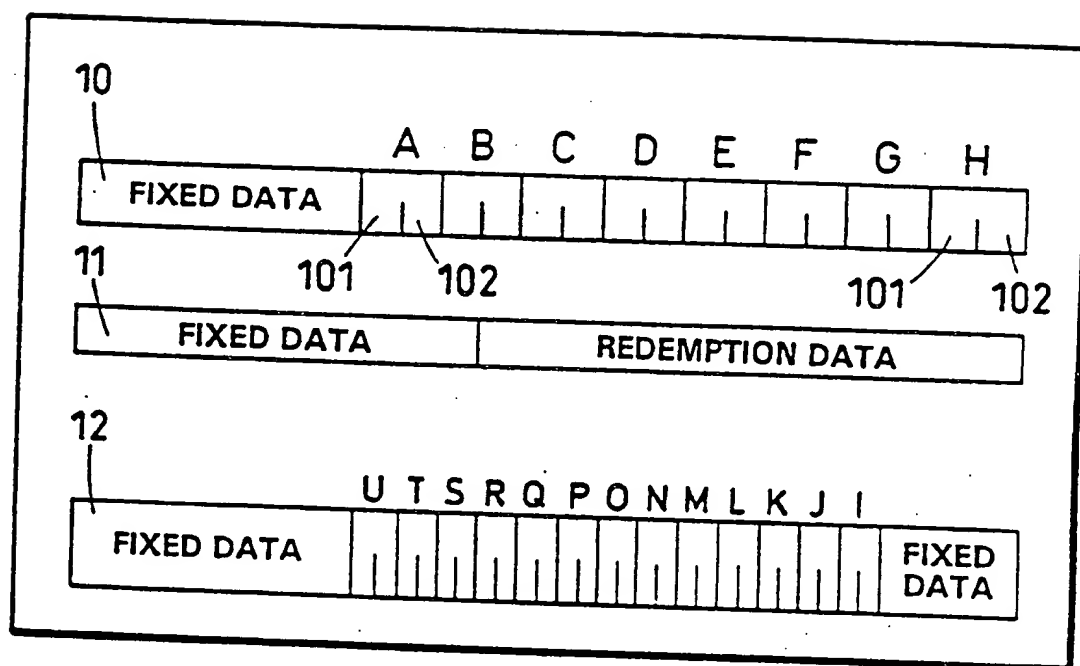
Fig.1

Fig.2(a)

Fig.2(b)

10

A B C D E F G H

FIXED DATA

11   101   102   101   102

FIXED DATA   REDEMPTION DATA

12

U T S R Q P O N M L K J I

FIXED DATA ||||||||||||||||||||||| FIXED DATA

Fig.2(c)

CUSTOMER DISPLAY — 24

21   201   204   22

1

CARD READER/ WRITER

PROCESSING UNIT

MEMORY

206   205   203   23

207 - - - COMPUTER

OPERATOR DISPLAY — 26

KEYPAD — 27

25

Fig. 3(a)

33   31   32

CODE (TARIFF) KEYS

NUMERIC KEYS

CONTROL KEYS

Fig. 3(b)

Fig.4
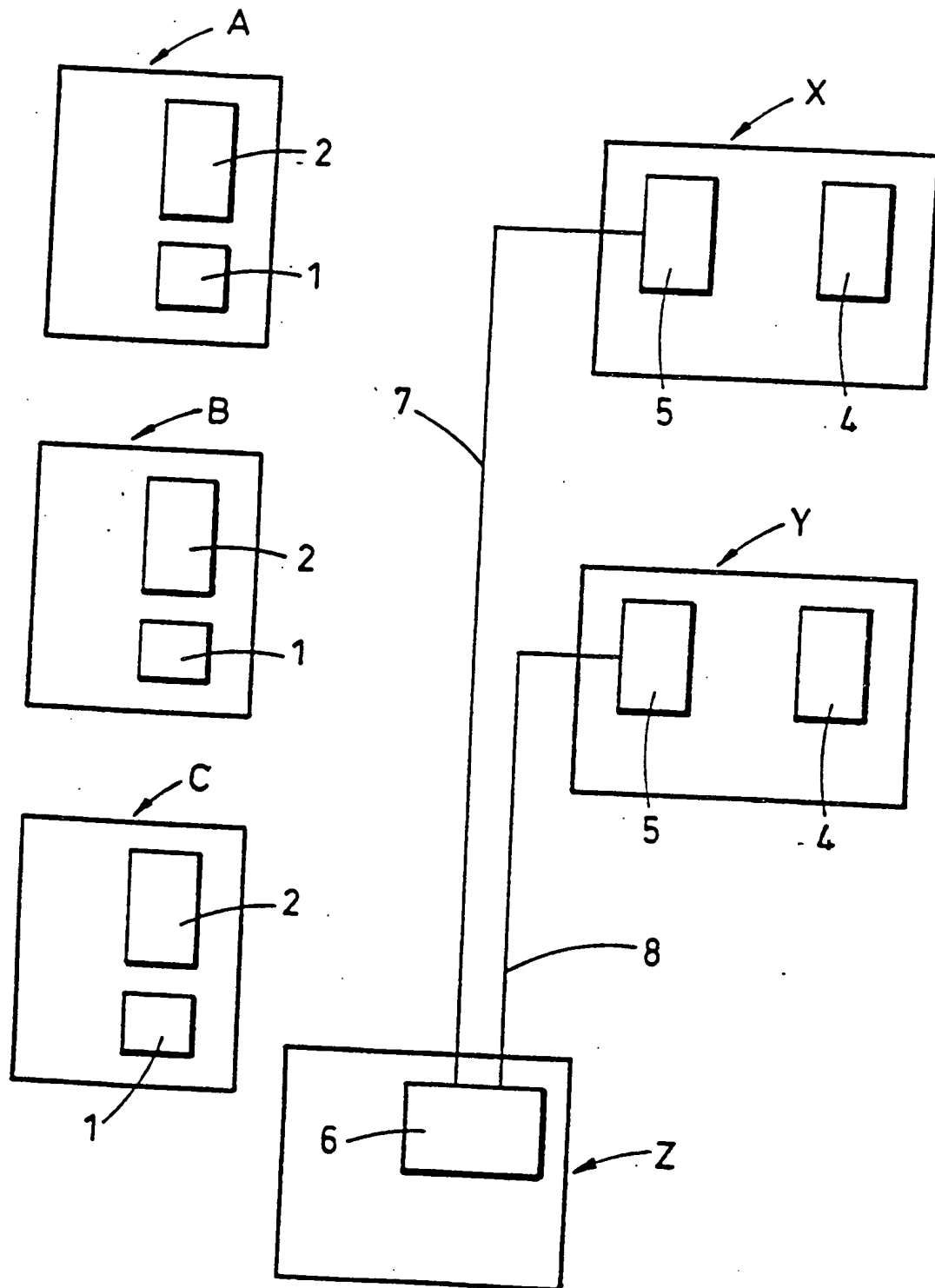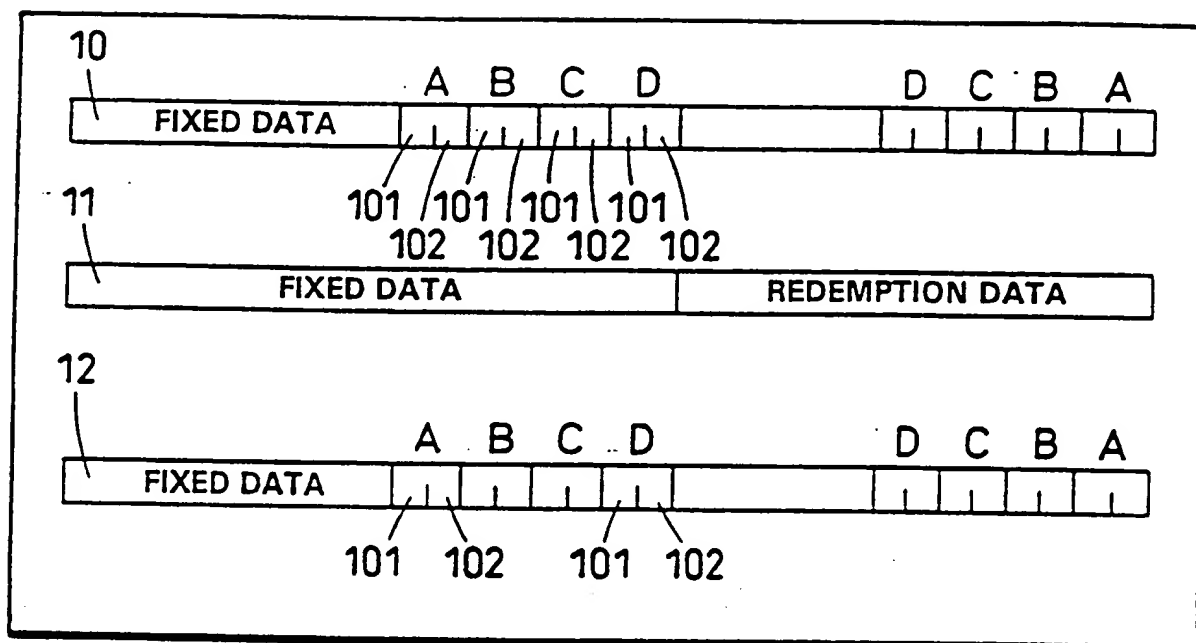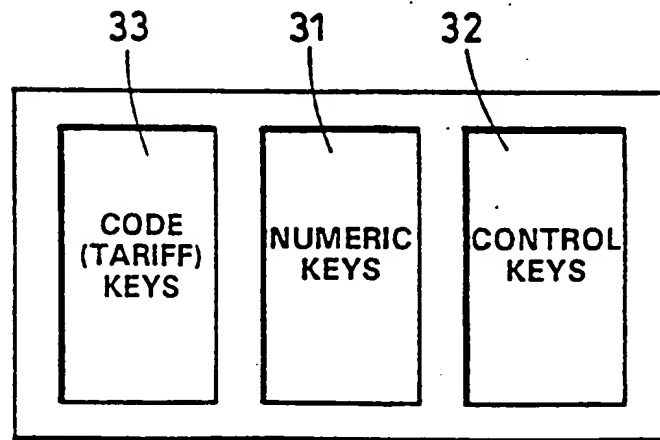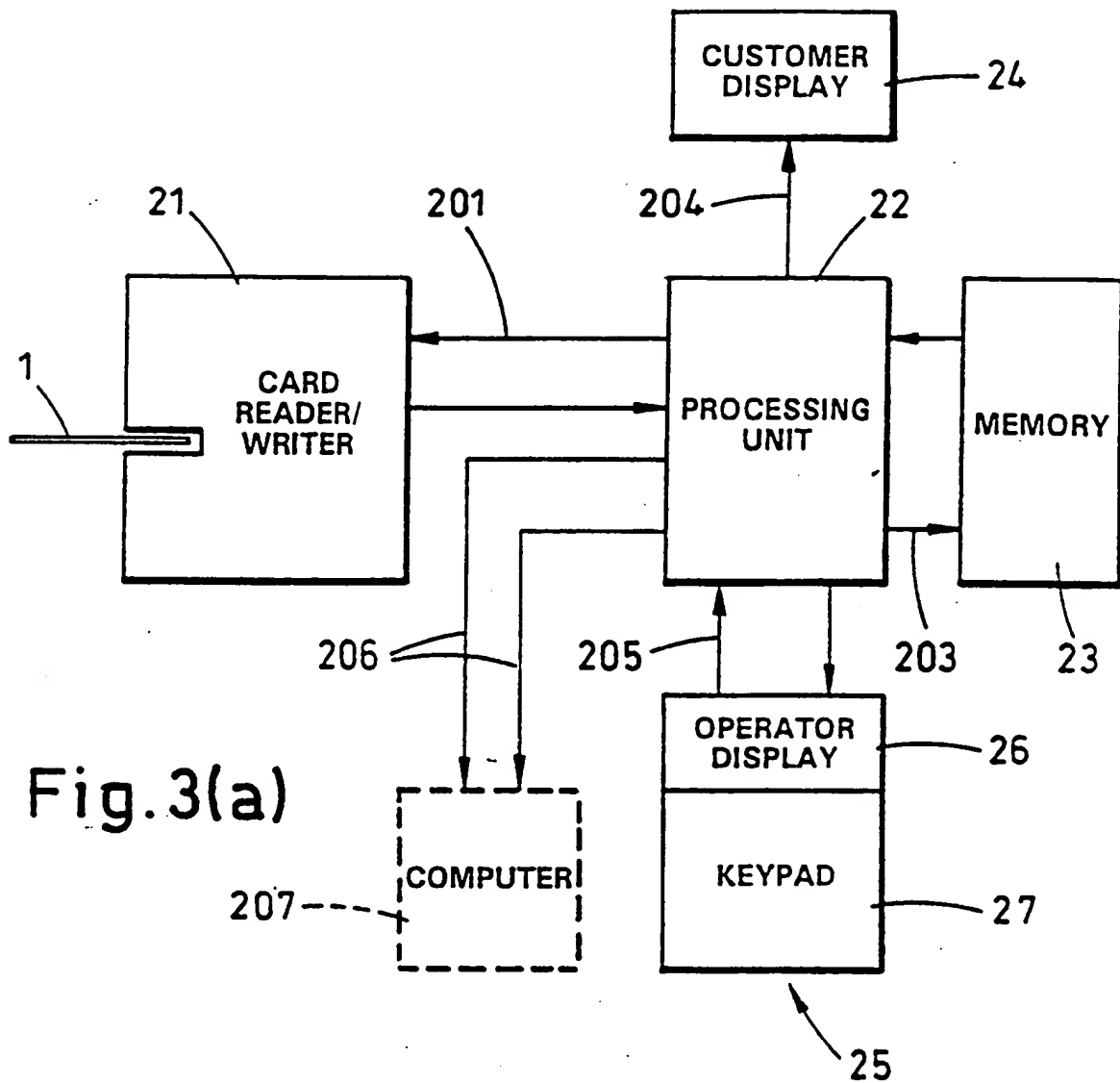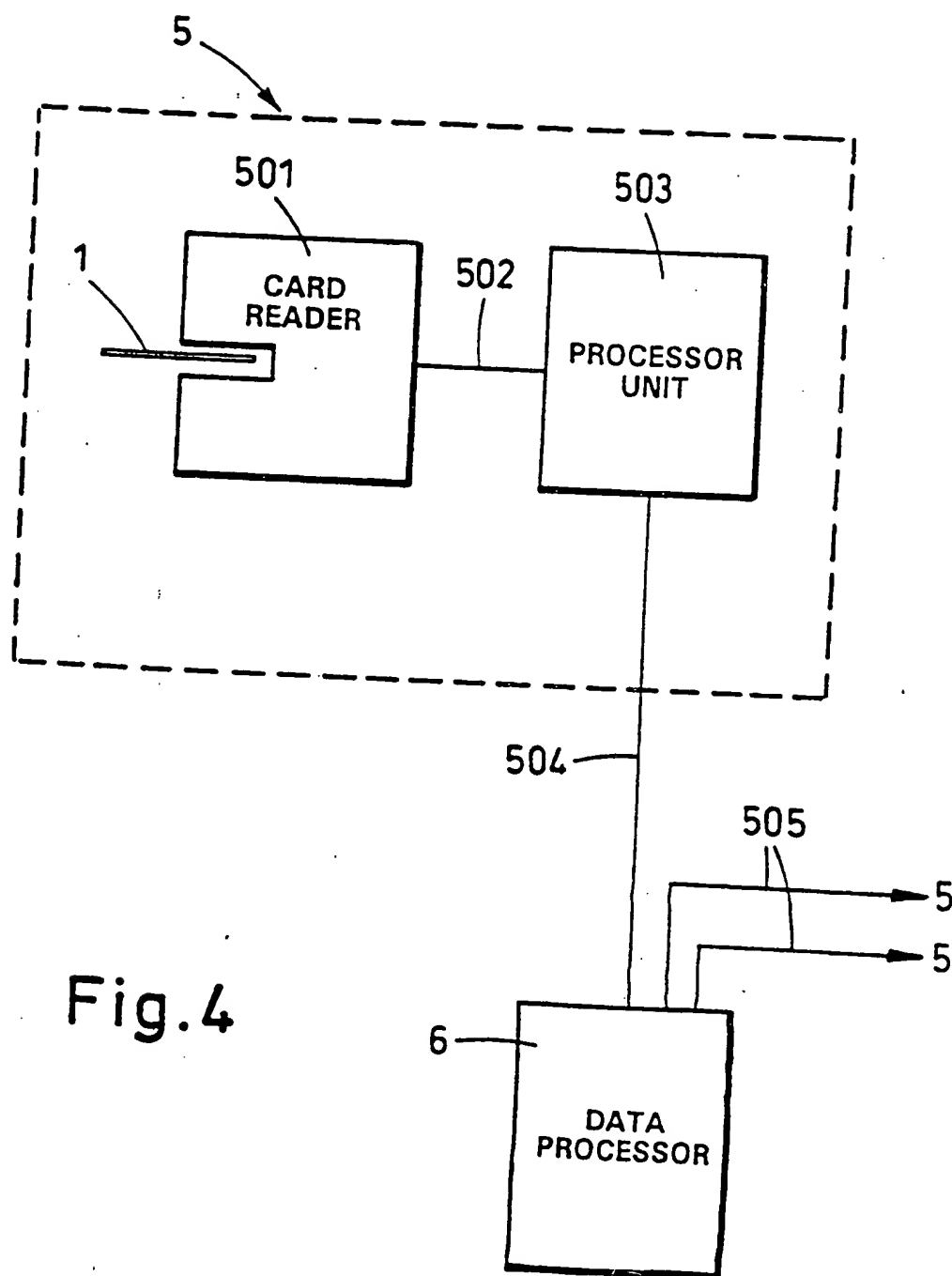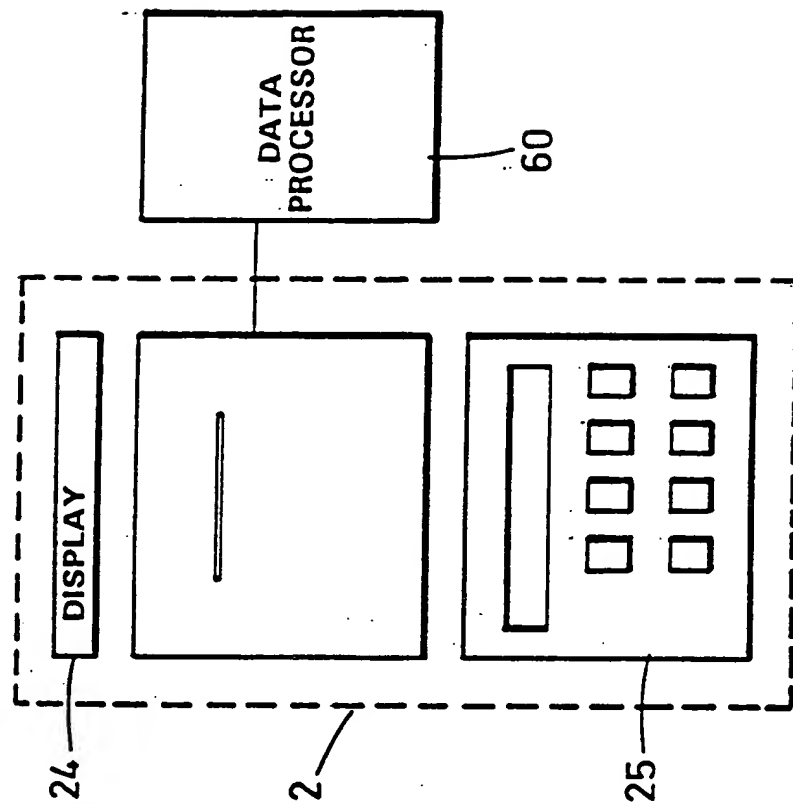
Fig.6
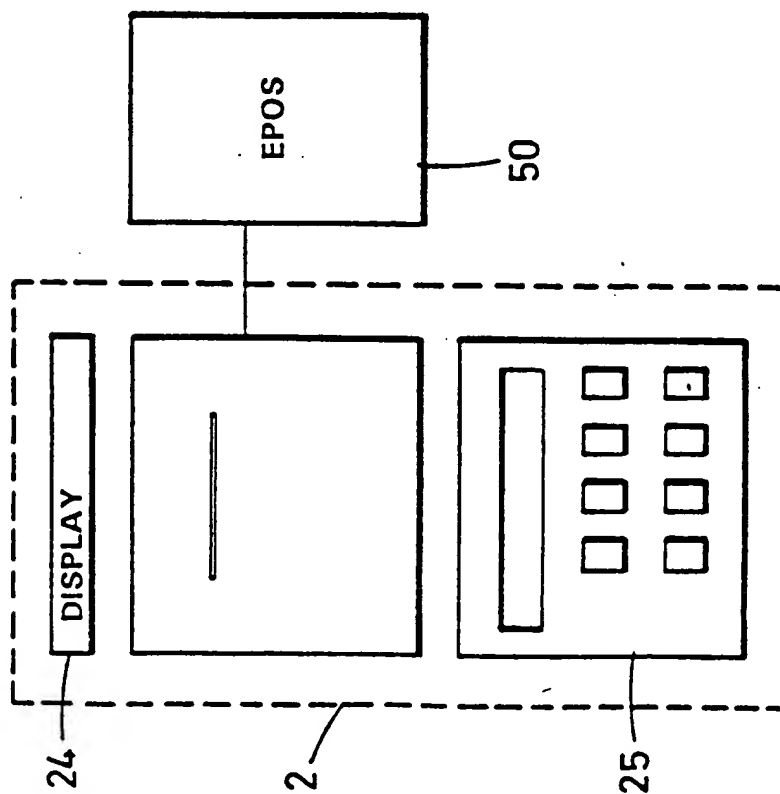
Fig.5

FIG. 7

INTERNATIONAL SEARCH REPORT

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC^5:   G 07 F 7/10

II. FIELDS SEARCHED

Minimum Documentation Searched

Classification System	Classification Symbols
IPC^5	G 07 F 7/00, G 07 F 19/00

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched

III. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
Y	DE, A1, 3 911 667 (ROBERT BOSCH GMBH) 11 October 1990 (11.10.90), claims 1,3; fig. 1.	1-5,9, 11-13
A	Claims 1,3; fig. 1.	6,10, 21,34, 36
	--	
Y	DE, A1, 3 620 755 (ROBERT BOSCH GMBH) 23 December 1987 (23.12.87), claims 3,5.	1-5,9, 11-13
A	Claims 3,5.	14-18, 20,27, 28,31, 35
	--	
A	EP, A2, 0 202 473 (SONY CORPORATION) 26 November 1986 (26.11.86), column 5, lines 9-13.	1,25, 26,29, 30,32, 33,36, 38

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the International filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the International filing date but later than the priority date claimed

"T" later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
16 December 1993	12. 01. 94

International Searching Authority	Signature of Authorized Officer

ANHANG

zum internationalen Recherchen-
bericht über die internationale
Patentanmeldung Nr.

ANNEX

to the International Search
Report to the International Patent
Application No.

ANNEXE

au rapport de recherche inter-
national relatif à la demande de brevet
international n°

PCT/GB 93/02103 SAE 80408

In diesem Anhang sind die Mitglieder
der Patentfamilien der im obenge-
nannten internationalen Recherchenbericht
angeführten Patentdokumente angegeben.
Diese Angaben dienen nur zur Unter-
richtung und erfolgen ohne Gewähr.

This Annex lists the patent family
members relating to the patent documents
cited in the above-mentioned inter-
national search report. The Office is
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of information.

La présente annexe indique les
membres de la famille de brevets
relatifs aux documents de brevets cités
dans le rapport de recherche inter-
national visée ci-dessus. Les reseigne-
ments fournis sont donnés à titre indica-
tif et n'engagent pas la responsabilité
de l'Office.

Im Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
DE A1 3911667	11-10-90	keine - none - rien	
DE A1 3620755	23-12-87	keine - none - rien	
EP A2 202473	26-11-86	AU A1 56132/86	23-10-86
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